Economic Analysis of Farm Digesters

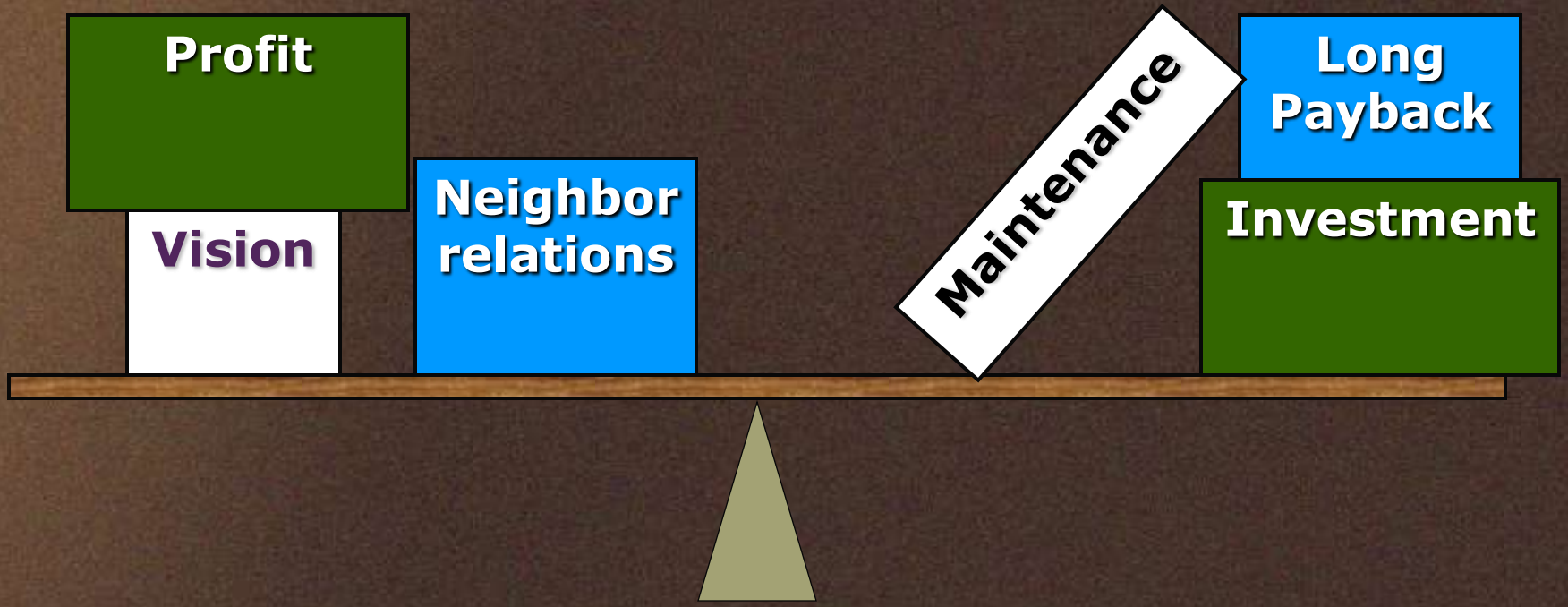
Crystal Powers, Extension Engineer

Rick Stowell, Ph.D., P.E., Extension Engineer

2011 WORKS! Conference

Wichita, KS

Producers are Looking to Tip Scales in Their Favor

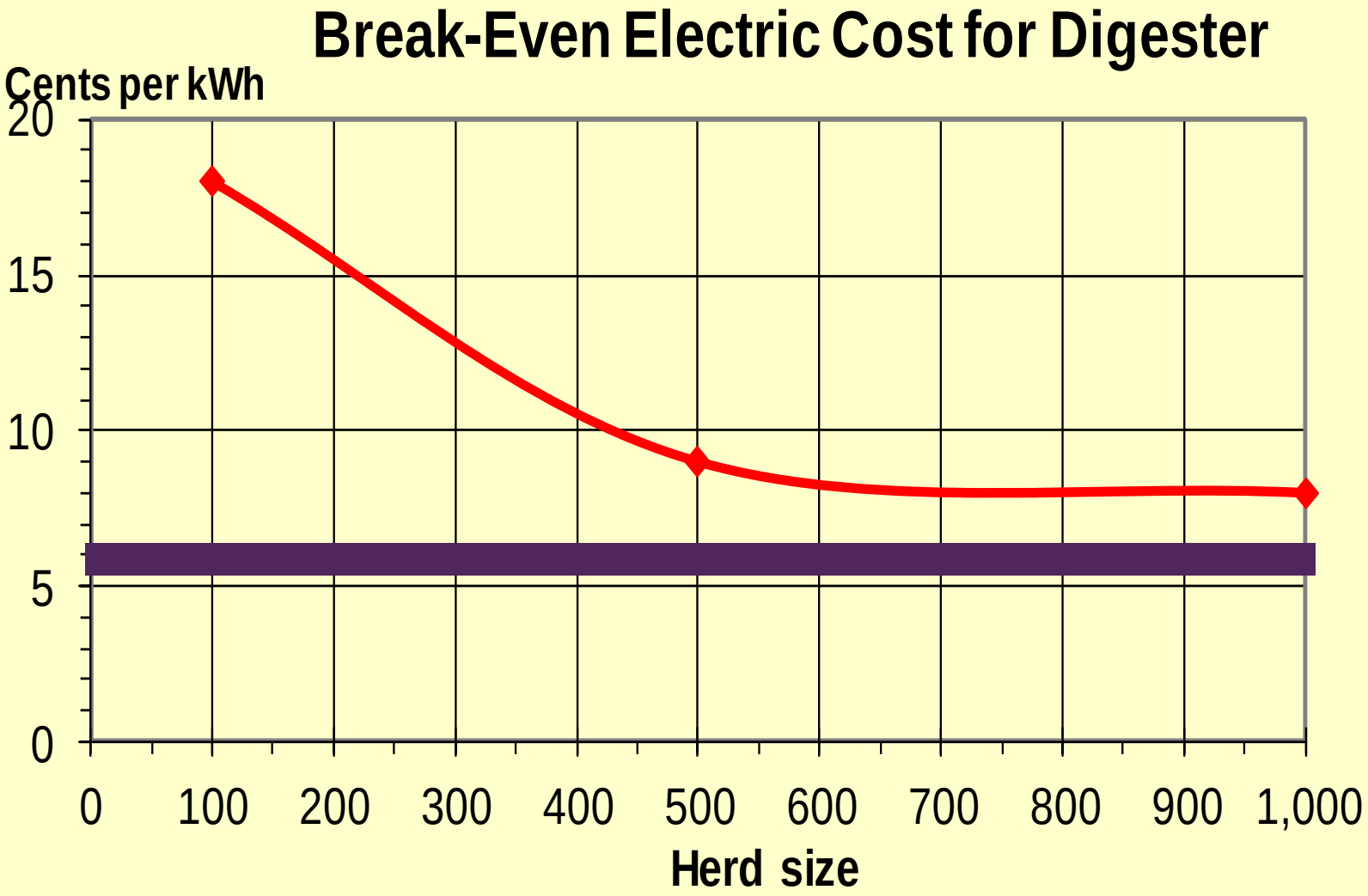


Economics of Methane Recovery: *2003*

- **Inputs:**
  - Electricity offset on-farm use - 6 ¢/kWh
  - 1997 Construction costs
  - Incentives

Would incentives help?

- No-interest loan
- Cost-share program
- Tax credits
- Sale of excess electricity


Break-Even Electric Cost for Digester
Cents per kWh
20
15
10
5
0
0
100
200
300
400
500
600
700
800
900
1,000
Herd size

Economic Summary:

	10,000-head swine finisher	1000-head dairy
Capital cost	$491,000	$296,000
Break-even price on electricity	8.5 ¢ / kWh	8 ¢ / kWh
Payback	8.2 years	7.9 years
Return on investment	(-)	(-)

No incentives

Economic Summary

Any realistic incentive noticeably improved the economic picture

Ignored ‘intangible costs/benefits’

Odor Control

Land application

Storage

How important is odor control?

- **Very challenging to assign a value**
  - No value ←→ Relatively high value

Would a basic cover serve our needs better?

Lower capital & maintenance

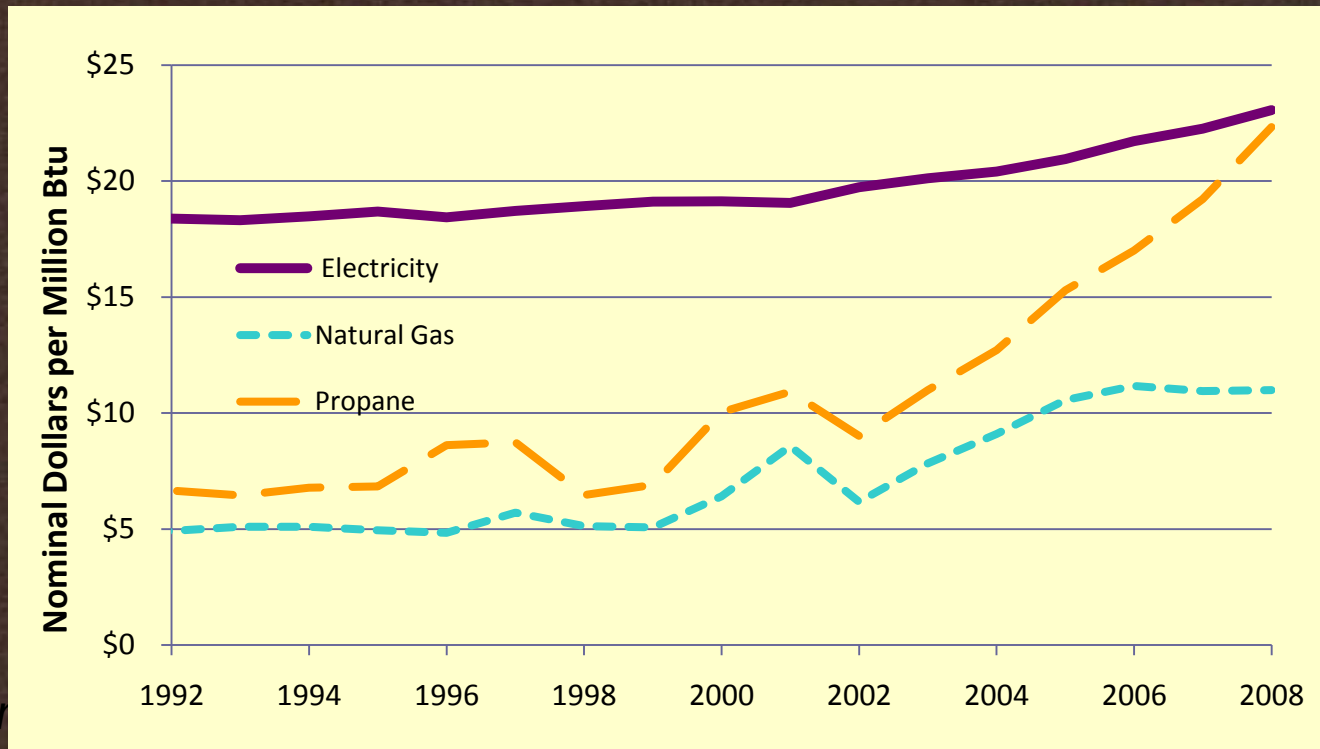
Fertilizer

Reduced odor

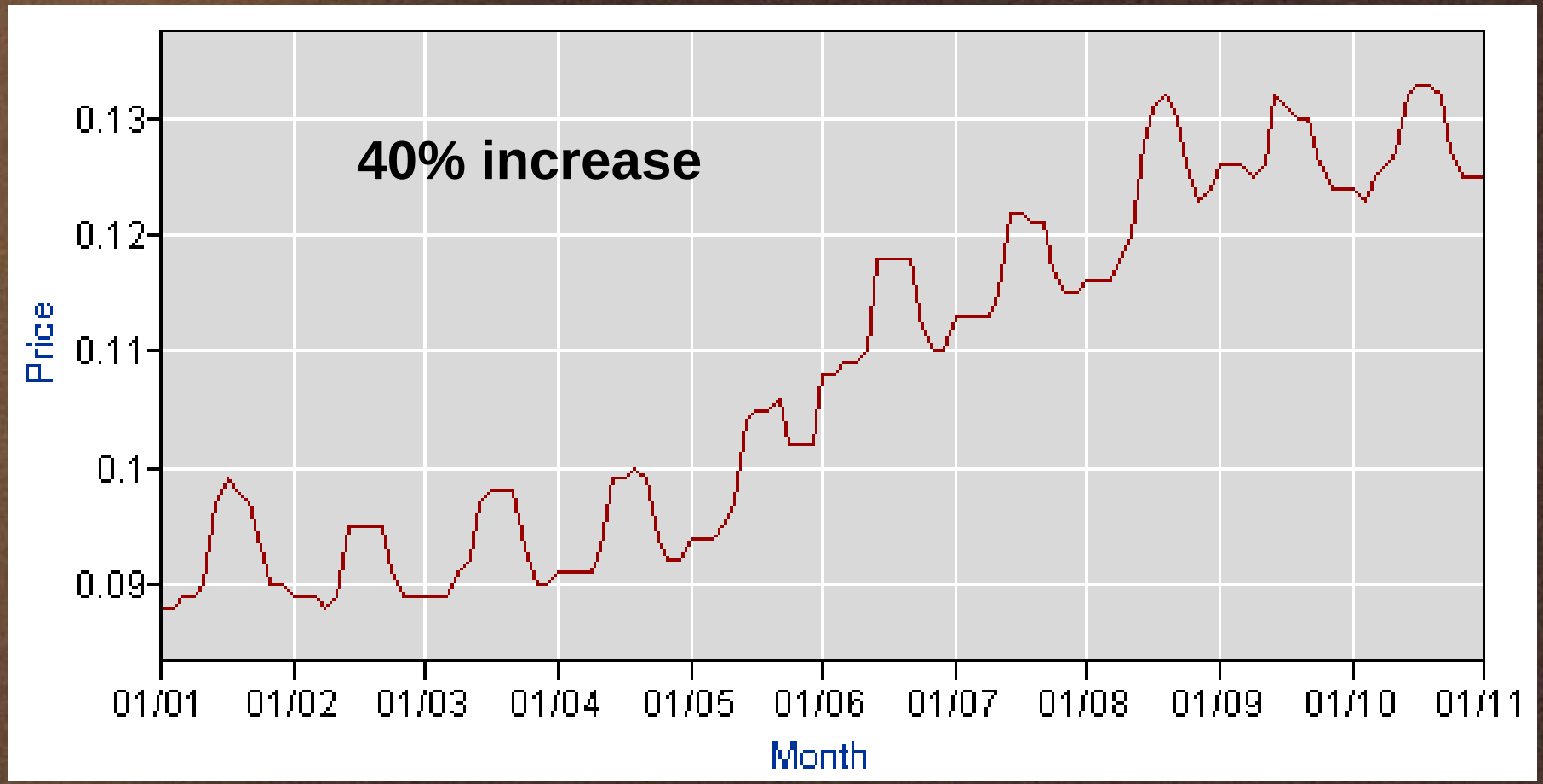
No payback potential

What about Today, Tomorrow?
Energy Price Trends – NE & KS

- NE 9th lowest electricity rate – 7.5 ¢/kWh
- KS 18th – 8.2 ¢/kWh
- 32% increase

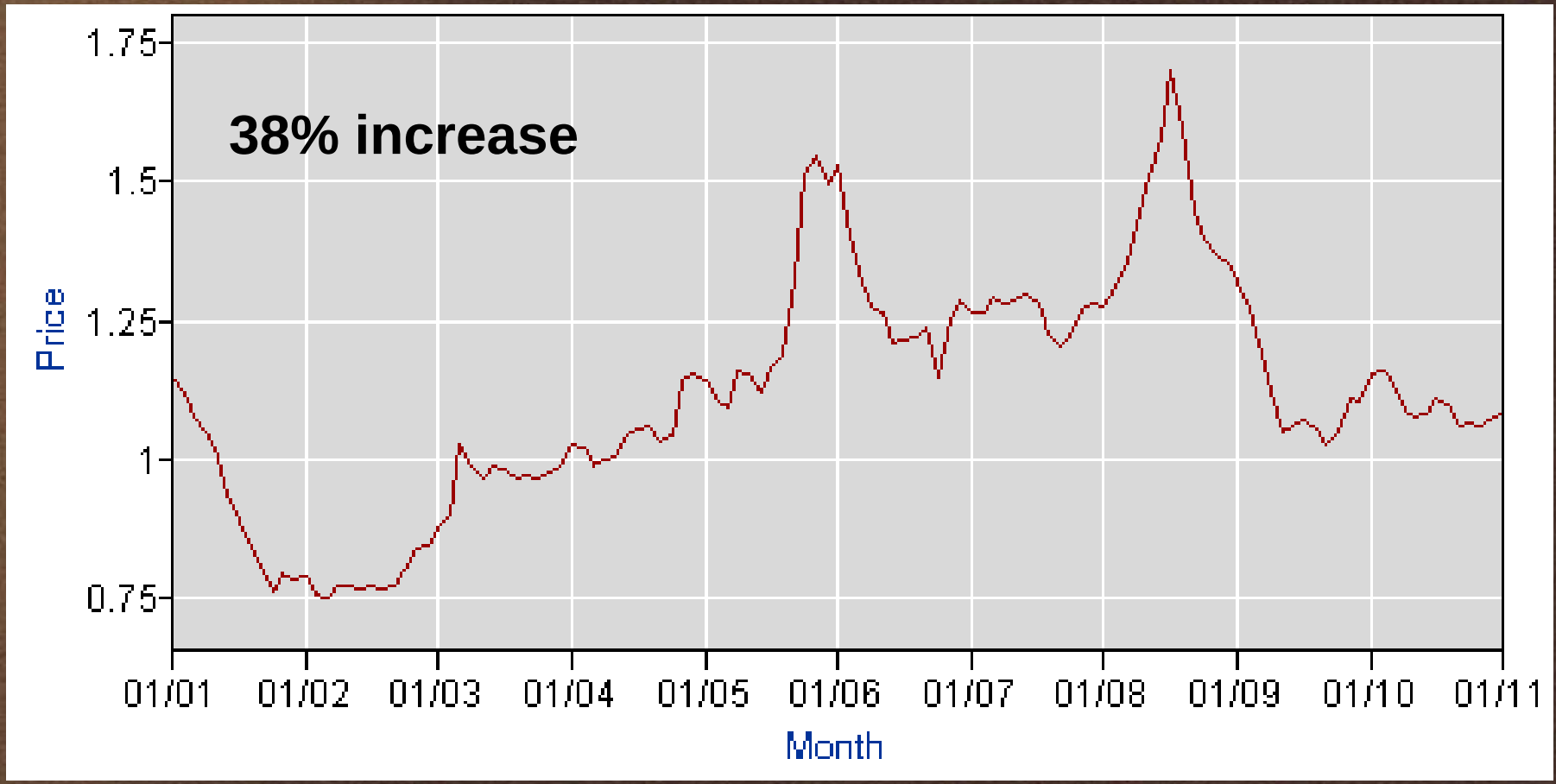


National Electricity Price



Source: Bureau of Labor Statistics

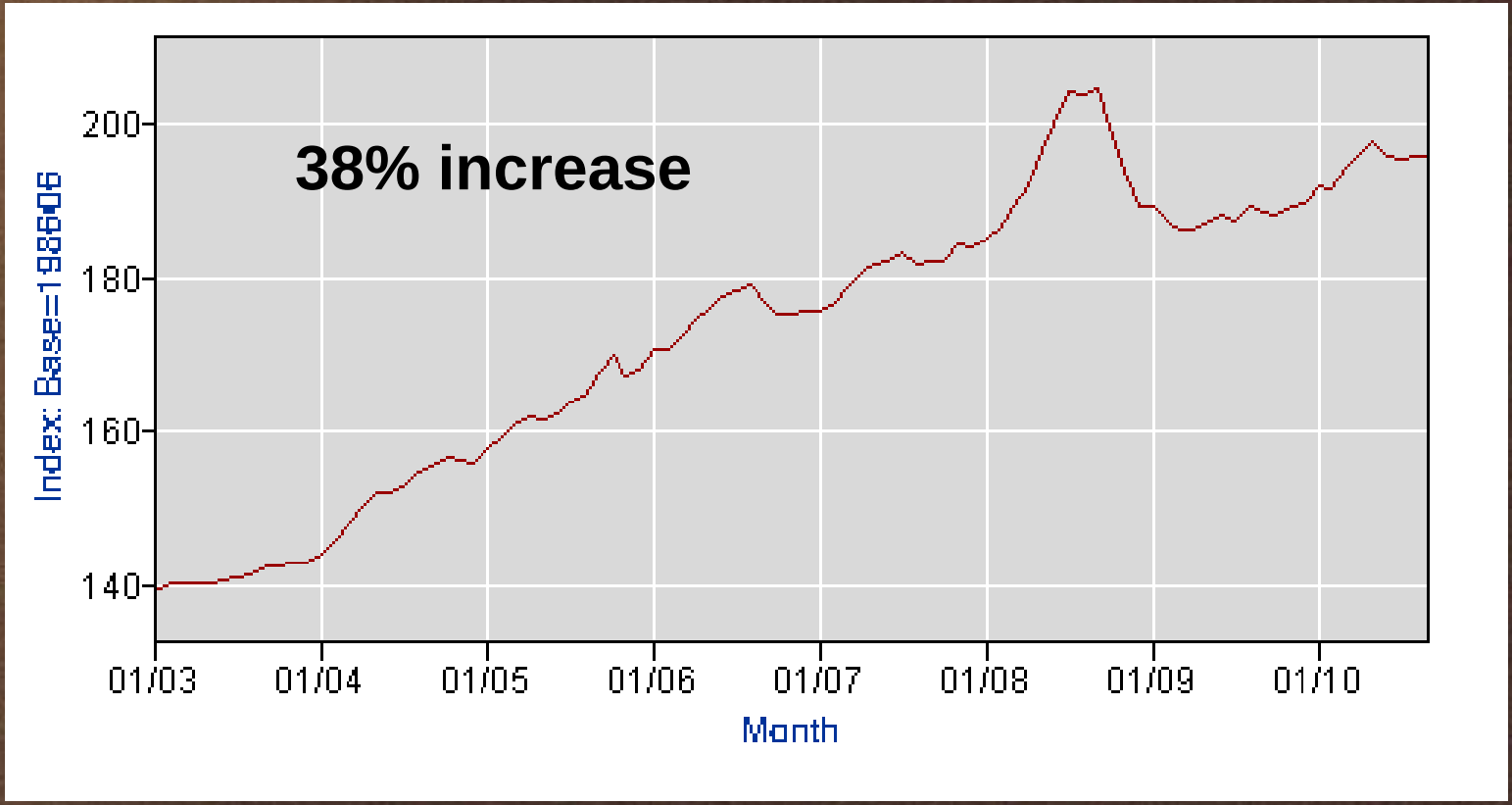
Natural Gas Price



Source: Bureau of Labor Statistics

Construction Cost

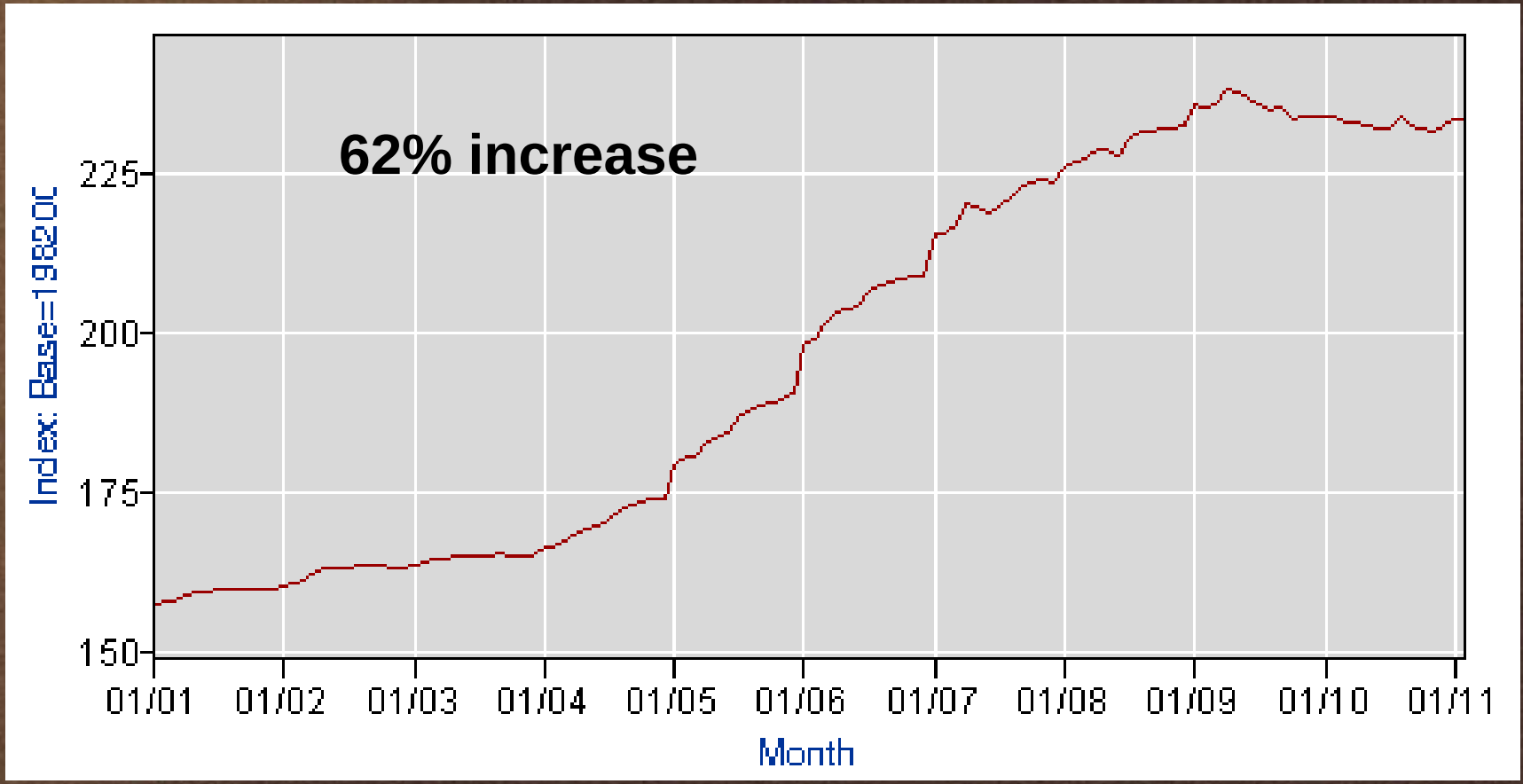
- materials & labor cost



Source: Bureau of Labor Statistics

Concrete Price

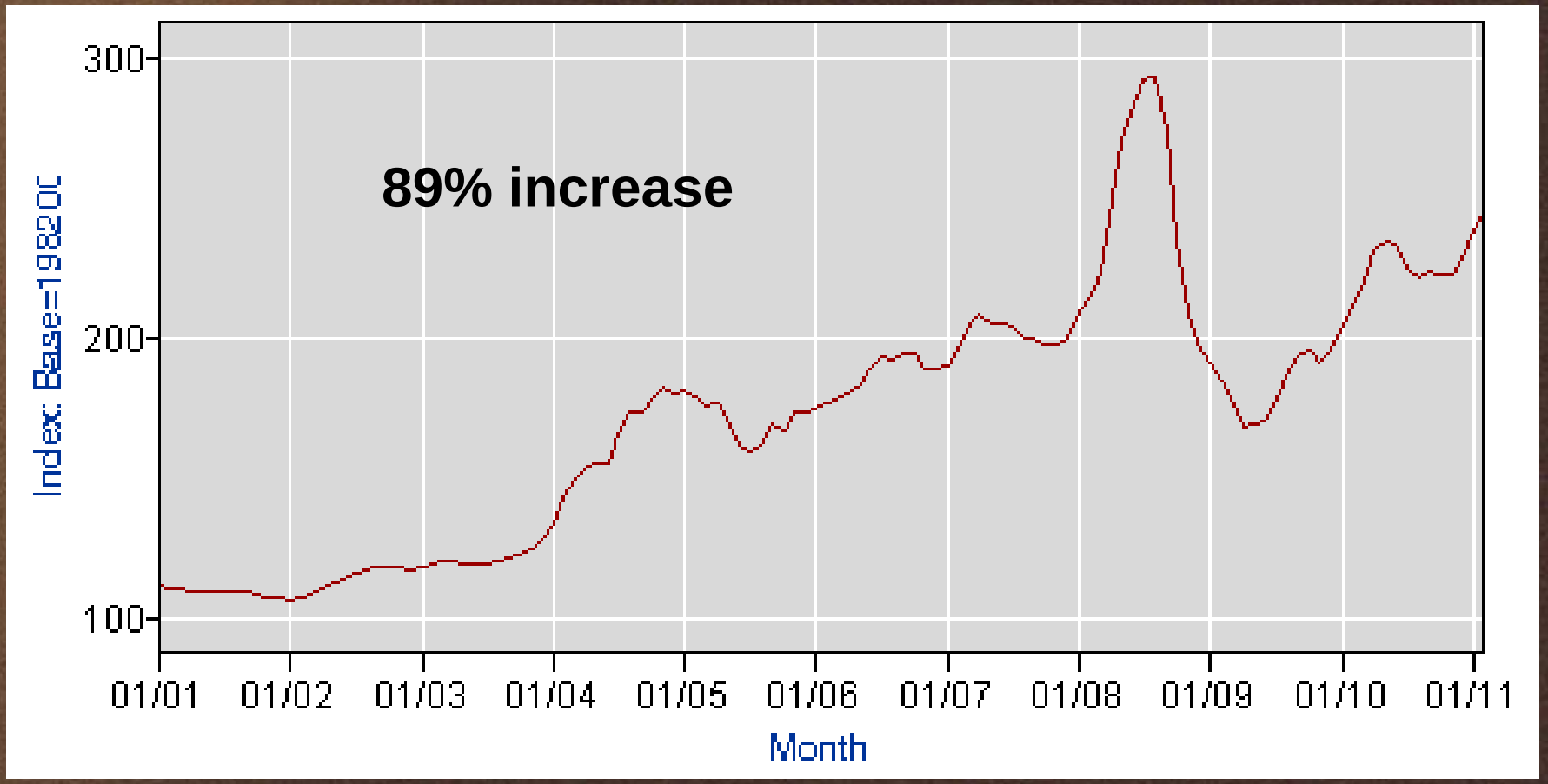
Digester Tank



Source: Bureau of Labor Statistics

Steel and Iron Price

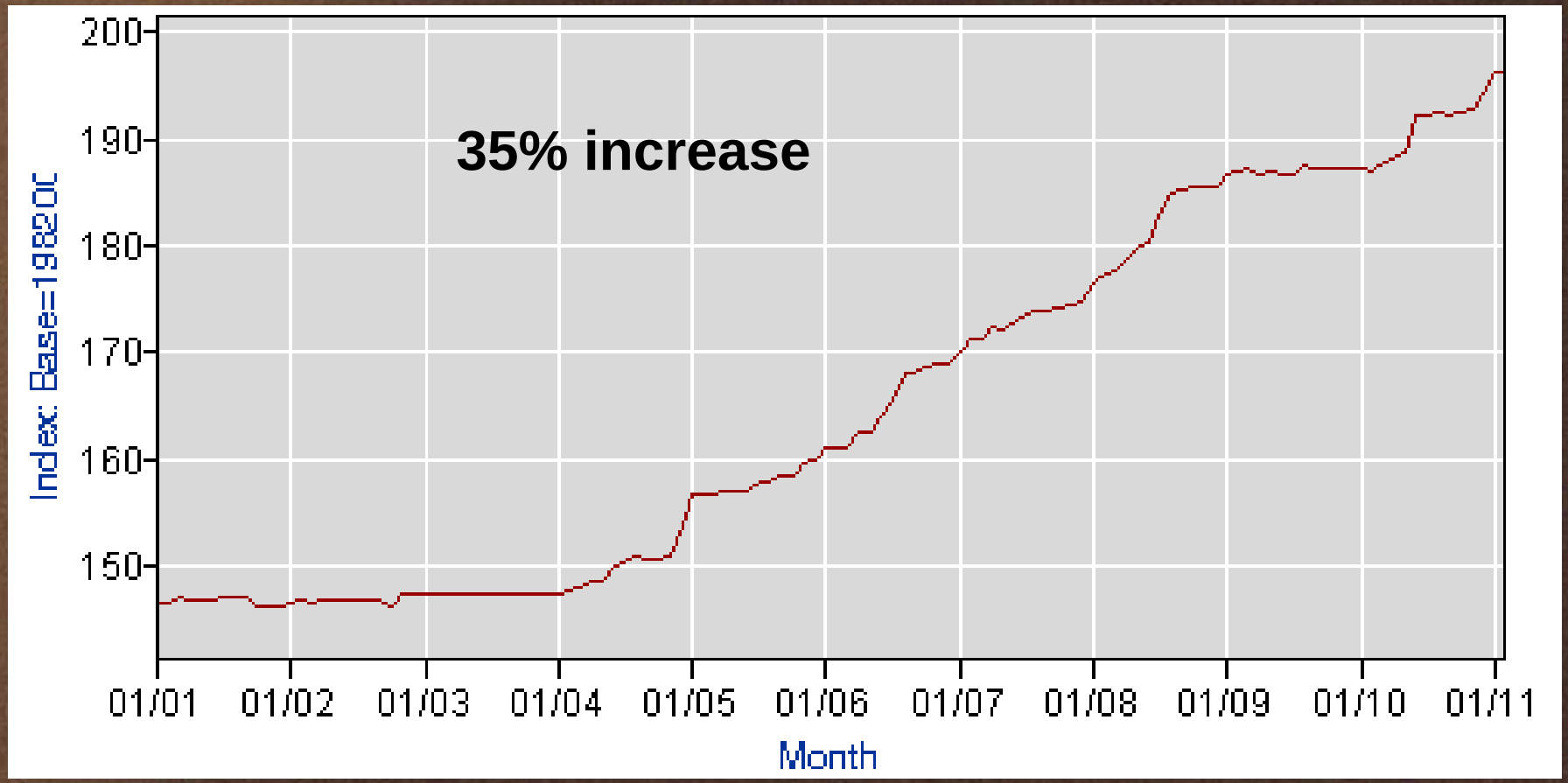
Framing & Equipment



Source: Bureau of Labor Statistics

Engine & Generator Price

20-40% of Project Cost



Source: Bureau of Labor Statistics

Summary of Trends

- **energy ≠ construction costs**
- **More grants and credits**
  - Will these continue?

38 Case Studies - 2008

- 36% of capital in electrical generation
- Few compete with electricity cost
- Many compete with natural gas price

Bracmort et al., 2008

So why are some states building digesters?

- Tipping fees for using wastes
- Net-metering / cost of electricity
- Grants
- Other critical factors
  - Odor
  - Regional renewable energy portfolios

Digesters: What's Ahead?

- **Energy prices outpace construction costs?**
- **Reduce capitol costs**
  - Off-the-shelf AD technology?
- **More use with systems having high heat and power demands**
  - Use biogas directly to replace LP or natural gas
  - Reduced capital and O&M cost
- **More reliance on tertiary economic factors**
  - Tipping fees
  - Gov. incentives (tax credits, grants, cost-share, loans, etc.)
  - Carbon credits

Questions?

For more information:

- **Available:**
  - Original 2003 economic studies:
    The Economic Potential of Methane Recovery
  - Economic update
  - *Carbon Credits for Livestock Production* factsheet
- **Go to <manure.unl.edu>**